**SP21 Project: Analysis of First-Person A.I Training Methods**

Capstone Weekly Status Report

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<https://github.com/rebeljedi999/TheCTeam>

**REPORT WEEK 11 (MAY 3 – MAY 9)**

1. Weekly Accomplishments
   1. Kyle H. continued training the model and has achieved some progress.
   2. Paul did some minor bug fixes and some testing with a different NN
   3. Kyle M., Somayyeh, and Yohannes all worked on updating their environments to run the current version of the experiment.
   4. Kyle M. ran some initial training sessions to confirm his environment is working.
2. Problems/Issues
   1. Kyle M., Somayyeh, and Yohannes all experienced issues updating their environment, a work around was achieved through a direct export of the environment.
3. Next week’s planned work
   1. All members will be conducting model training on their machines and altering reward methods to create a model that scores highest.
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 6 |
| Kamyab | 2.5 |
| McQuillen | 2 |
| Teref | 3 |
| Wells | 6 |
| Team Total | 19.5 |

**REPORT WEEK 10 (APR 26 – MAY 2)**

1. Weekly Accomplishments
   1. Kyle H. implemented data normalization and has begun to train the model, has achieved some results. Needs to be updated to newest version.
   2. Kyle M. finished implementing 3D visual sensor
   3. Somayyeh finished UI update
   4. Yohannes finished work on random spawning of targets of multiple targets
   5. Paul finished first version of analysis tool
2. Problems/Issues
   1. Somayyeh experienced system issues when trying to run the project
3. Next week’s planned work
   1. Kyle H. will continue to train the agent to solve static levels and then shift to dynamic levels when they are implemented
   2. Kyle M. will begin to work on training the model and experimenting with reward systems
   3. Yohannes will begin to work on training the model and experimenting with reward systems
   4. Somayyeh will begin to work on training the model and experimenting with reward systems
   5. Paul will implement the dynamic level and experiment with different NN architectures
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 4.5 |
| Kamyab | 3.5 |
| McQuillen | 3 |
| Teref | 4 |
| Wells | 4 |
| Team Total | 19 |

**REPORT WEEK 9 (APR 19 – APR 25)**

1. Weekly Accomplishments
   1. Kyle H. implemented model load function and setup REST API for it
   2. Kyle M. continued working towards implementing 3D visual sensor
   3. Somayyeh continued work on scoring system
   4. Yohannes continued work on random spawning of targets of multiple targets, more advanced system with customizable input is needed
   5. Paul implemented model saving and loading into UE4 developer interface and worked more on the jupyter report as well as implemented the situational awareness sensor
2. Problems/Issues
   1. Various delays and time conflicts negatively impacted the projects progress this week
3. Next week’s planned work
   1. Kyle H. will be testing the agent and modifying reward systems to get the agent to solve static levels.
   2. Kyle M. will continue implementation of 3D visual sensors
   3. Yohannes will continue to modify level randomization to allow for more customization.
   4. Somayyeh will continue working on a scoring system.
   5. Paul will finish the data analysis pipeline, ensure all other parts are done and then begin training the model as well
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 3 |
| Kamyab | 2 |
| McQuillen | 2 |
| Teref | 1 |
| Wells | 7 |
| Team Total | 15 |

**REPORT WEEK 8 (APR 12 – APR 18)**

1. Weekly Accomplishments
   1. Kyle H. finished implementation of additional sensor data to the agent and finished model save function
   2. Kyle M. worked towards implementing 3D visual sensor
   3. Somayyeh continued work on scoring system
   4. Yohannes continued work on random spawning of targets of multiple targets, more advanced system with customizable input is needed
   5. Paul continued work on data analysis pipeline
2. Problems/Issues
   1. No serious issues were encountered
3. Next week’s planned work
   1. Kyle H. will be testing the agent and modifying reward systems to get the agent to solve static levels.
   2. Kyle M. will continue implementation of 3D visual sensors and situational awareness.
   3. Yohannes will modify level randomization to allow for more customization.
   4. Somayyeh will continue working on a scoring system.
   5. Paul will continue implementation of data analysis pipeline and work on cleaner developer interface.
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 3 |
| Kamyab | 2 |
| McQuillen | 1 |
| Teref | 1 |
| Wells | 1 |
| Team Total | 8 |

**REPORT WEEK 7 (APR 5 – APR 11)**

1. Weekly Accomplishments
   1. Kyle H. worked on the implementation of additional API endpoints for metric collection, as well as on an API endpoint for saving the Agent after training.
   2. Kyle M. researched potential implementation for 3D visual sensing
   3. Somayyeh worked on creating scoring system
   4. Yohannes worked on random spawning of targets, basic implementation needs more testing
   5. Paul implemented data collection in UE4 and API endpoint to receive and save data. Also fixed memory leak so long term testing can be run.
2. Problems/Issues
   1. No serious issues were encountered
3. Next week’s planned work
   1. Kyle H. will implement better input on the python server and continue working on saving and loading the model.
   2. Kyle M. will continue implementation of 3D visual sensors and situational awareness.
   3. Yohannes will finish implementation of level randomization and then begin working on reward systems and training.
   4. Somayyeh will continue working on a scoring system.
   5. Paul will continue implementation of data analysis pipeline and then will switch to researching Genetic Algorithm implementation.
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 2 |
| Kamyab | 2.5 |
| McQuillen | 3 |
| Teref | 3.5 |
| Wells | 7 |
| Team Total | 18 |

**REPORT WEEK 6 (MAR 29 – APR 4)**

1. Weekly Accomplishments
   1. Kyle H. implemented flask API and machine learning agent.
   2. Kyle M. and Paul implemented visual sensor observation.
   3. Somayyeh researched reward methods and potential implementations.
   4. Yohannes finished first shoot house level.
   5. Paul implemented reward functions in game and finished framework for API requests for the Unreal Engine.
2. Problems/Issues
   1. Kyle H. had issues implementing a train function, it was discovered and resolved through changing agent methodology.
   2. Paul discovered a memory leak in the program that makes it difficult to do long training sessions, still unresolved.
3. Next week’s planned work
   1. Kyle H. will implement better input on the python server.
   2. Kyle M. will implement 3D visual sensors and situational awareness.
   3. Yohannes will implement level randomization.
   4. Somayyeh will work on implementing a scoring system.
   5. Paul will hunt down a memory leak, begin data collection for analysis, and assist others with the Unreal Engine.
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 24.5 |
| Kamyab | 5.5 |
| McQuillen | 4 |
| Teref | 4 |
| Wells | 15 |
| Team Total | 53 |

**REPORT WEEK 5 (MAR 22 – MAR 28)**

1. Weekly Accomplishments
   1. Paul and Kyle H. worked on creating an API that worked with TFAgents.
   2. Kyle M. continued work on enemy detection and visual sensor data. Reviewed JSON packet transmission through the Unreal Engine.
   3. Somayyeh worked on implementing AI actions into the Unreal Engine.
   4. Yohannes worked towards implementing our first test level.
2. Problems/Issues
   1. Sommayyeh is struggling finding the proper events to be called in the engine for implementing the actions. She is resolving it through research and trial and error.
3. Next week’s planned work
   1. Kyle H. will continue implementation of the API on the flask server.
   2. Kyle M. will continue implementing data collection for the Unreal Engine and formatting it into JSON.
   3. Yohannes will continue designing and implementing our first test level for the agent to train on.
   4. Somayyeh will continue implementing our reward events and action events.
   5. Paul will prepare the Unreal Engine to send JSON data and assist others with the Unreal Engine.
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 7.5 |
| Kamyab | 5 |
| McQuillen | 6 |
| Teref | 3.5 |
| Wells | 4 |
| Team Total | 26 |

**REPORT WEEK 4 (MAR 15 – MAR 21)**

1. Weekly Accomplishments
   1. Paul and Kyle H. Worked on implementing a tensorflow agent and a custom environment.
   2. Kyle M. worked on sending information from the Unreal Engine to the python server. He is also working on enemy recognition for the agent in the game.
   3. Somayyeh continued to familiarize herself with Unreal Engine and blueprint programming.
   4. Yohannes is learned level design and scoring in the Unreal Engine. Worked towards implementing our first test level.
2. Problems/Issues
   1. Paul and Kyle H. struggled to implement a custom environment in a way that’s compatible with the Unreal Engine setup. Potential resolution has been discovered by dissecting the Tensorflow library to better understand it. Further testing is needed.
3. Next week’s planned work
   1. Paul and Kyle H. will implement the full API to receive live data from the Unreal Engine and return data to the engine.
   2. Kyle M. is implementing data collection for the Unreal Engine and formatting it into JSON.
   3. Yohannes is designing and implementing our first test level for the agent to train on.
   4. Somayyeh is implementing our reward events and action events.
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 7 |
| Kamyab | 1.5 |
| McQuillen | 4 |
| Teref | 5 |
| Wells | 7 |
| Team Total | 24.5 |

**REPORT WEEK 3 (MAR 8 – MAR 14)**

1. Weekly Accomplishments
   1. Paul implemented a flask server to run python on. Also installed a plugin to unreal to allow the sending of JSON to a server and receive JSON from a server. This is the beginning of the implementation of the AI.
   2. Kyle H. concluded C++ NN research and shifted to Tensorflow agent research for implementation.
   3. Kyle M. reviewed potential reward system implementation in UE4 and began figuring out how to translate in-game data into learnable data and how to transmit it through JSON.
   4. Somayyeh researched blueprints and reinforcement learning.
   5. Yohannes researched reinforcement learning and its implementation in tensorflow.
2. Problems/Issues
   1. Paul had issues getting the JSON plugin working with UE4, resolved by changing plugins.
3. Next week’s planned work
   1. Paul and Kyle H. will begin implementing reinforcement learning in Tensorflow to prepare fore data from the unreal engine.
   2. Kyle M., Somayyeh, and Yohannes will begin implementation of collection from the UE4 agents and the transmitting of data from the game to the learning server.
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 3.5 |
| Kamyab | 5 |
| McQuillen | 7 |
| Teref | 4 |
| Wells | 15 |
| Team Total | 34.5 |

**REPORT WEEK 2 (MAR 1 – MAR 7)**

1. Weekly Accomplishments
   1. Kyle H. and Paul researched ways to implement a neural network into unreal engine and settled on a way that utilizes Tensorflow.
   2. Paul began the implementation of Tensorflow in the Unreal Engine.
   3. Kyle M., Somayyeh, and Yohannes did research on potential reward algorithms we could use and how to implement them into the Unreal Engine.
2. Problems/Issues
   1. Paul had issues with installing dependencies for the project, but resolved the issue by reinstalling python.
3. Next week’s planned work
   1. Kyle M, Somayyah, and Yohannes will implement the reward methods into the unreal engine.
   2. Kyle H. and Paul will implement the neural network with Tensorflow.
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 3.5 |
| Kamyab | 3 |
| McQuillen | 1 |
| Teref | 3.5 |
| Wells | 4 |
| Team Total | 15 |

**REPORT WEEK 1 (FEB 22 - FEB 28)**

1. Weekly Accomplishments
   1. All team members installed, ran, and familiarized themselves with the Unreal Engine environment.
   2. Kyle H., Kyle M., Paul, and Yohannes began tutorials on reinforcement learning in Unreal Engine.
   3. Kyle M. researched genetic algorithms and their possible implementation in Unreal.
2. Problems/Issues
   1. Somayyeh had initial problems with C++ programming, but after reviewing her notes she completed the basic tutorials for the Unreal Engine.
   2. Kyle M. is still trying to figure out the best way to implement the genetic algorithm.
   3. Yohannes struggled with some of the concepts in the reinforcement learning tutorial, but after further research he understands the concepts that were presented.
3. Next week’s planned work
   1. Kyle M., Somayyah, and Yohannes will research methods to reward NN and document potential algorithms.
   2. Kyle H. and Paul will begin a basic implementation of Reinforcement Learning algorithm and NN to get first generation.
4. Time log

|  |  |
| --- | --- |
| Last Name | Hours Worked |
| Hinton | 4.5 |
| Kamyab | 2 |
| McQuillen | 4 |
| Teref | 5 |
| Wells | 4 |
| Team Total | 19.5 |